

More of what will be discussed

The NIEHS Exposure Science and the Exposome Webinar Series

The NIEHS Exposure Science and the Exposome Webinar Series – Sensor Technologies for Improving Environmental Health: Juxtaposing the Citizen Science and Quantified Self Movements

Date: April 5, 2016

Time: 11:00 a.m. - 12:30 p.m. EST

One answer to the above question is that community-based environmental groups may have better access to monitoring technologies to document environmental injustices. In some respects, this is not entirely new, as community groups have for many years documented their local knowledge of air pollution levels in much more detail than what was possible through government monitoring efforts. The difference now, is that monitors are more readily available for these groups to collect their own objective measurements. Because of the low cost of each monitor, it is not implausible to imagine entire communities blanketed with a high density of air pollution sensors. And, in fact, NIEHS-funded research is demonstrating that such community-engaged monitoring networks are possible.

Slightly different from the community-initiated and led research described above, new air pollution technologies are enabling a new form of environmental research within our communities, called Citizen Science. While there are different models for conducting Citizen Science, the more intriguing examples are those that are organized over the Internet, involve many individuals who work together to crowdsource data, and result in massive amounts of data that are shared openly. In some cases, technology-savvy Citizen Science leaders are developing and sharing their designs for new monitors, providing proof of concept for how measurements can be made with low-cost sensors.

Another possible answer to the above question is that an increasing number of environmental epidemiology studies may use sensors to conduct personal exposure assessments. Sensors are not only getting cheaper, but also battery-powered and are getting smaller in size, making them increasingly practical for use in a variety of cohort studies. An exciting example of NIH support for this is the new Pediatric Research Using Integrated Sensor Monitoring Systems (PRISMS) program, within which various research groups are developing new wearable sensors that can measure environmental exposures that can be related to health symptoms for future children's asthma studies. An exciting aspect of the PRISMS program is the recognition that future sensors will likely need to be network-enabled, which would provide more immediate data from research subjects, as well as also enable more immediate feedback to research subjects.

While NIH programs like PRISMS are fostering future sensor technologies for epidemiologic research, the private sector is also commercializing air pollution monitors for the consumer health and wellness market. Smart technologies (e.g., smartphone apps, smart watches, fitness trackers, GPS loggers, etc.) used to be primarily marketed to the Quantified Self movement – individuals who use devices and data to track and optimize various aspects of their life – air pollution monitors being just one of latest devices that such an individual may want to use. But, there is a large group of individuals who have pre-existing health conditions and may be susceptible to air pollution exposures, which may be interested in understanding their air pollution exposures by either having a household or wearable monitor. While these individuals may be the greatest market for these new air pollution monitors, it remains unclear how people will respond to personalized air pollution exposure data (e.g., what are the best ways to communicate

individual-based air pollution exposures and risks?), or whether people have practical ways to manage their exposures.

In summary, the recent developments in low-cost air pollution monitoring devices illustrate various opportunities for improving environmental health through sensor technologies. The benefits to traditional community-based and epidemiologic research studies are somewhat clear, with new monitoring devices potentially providing data for more persons, places, and times than previously possible. Less clear, but no less exciting because of the reach and numbers of people potentially involved, are the novel ways in which new air pollution monitors are being adopted into Citizen Science and consumer health and wellness applications.